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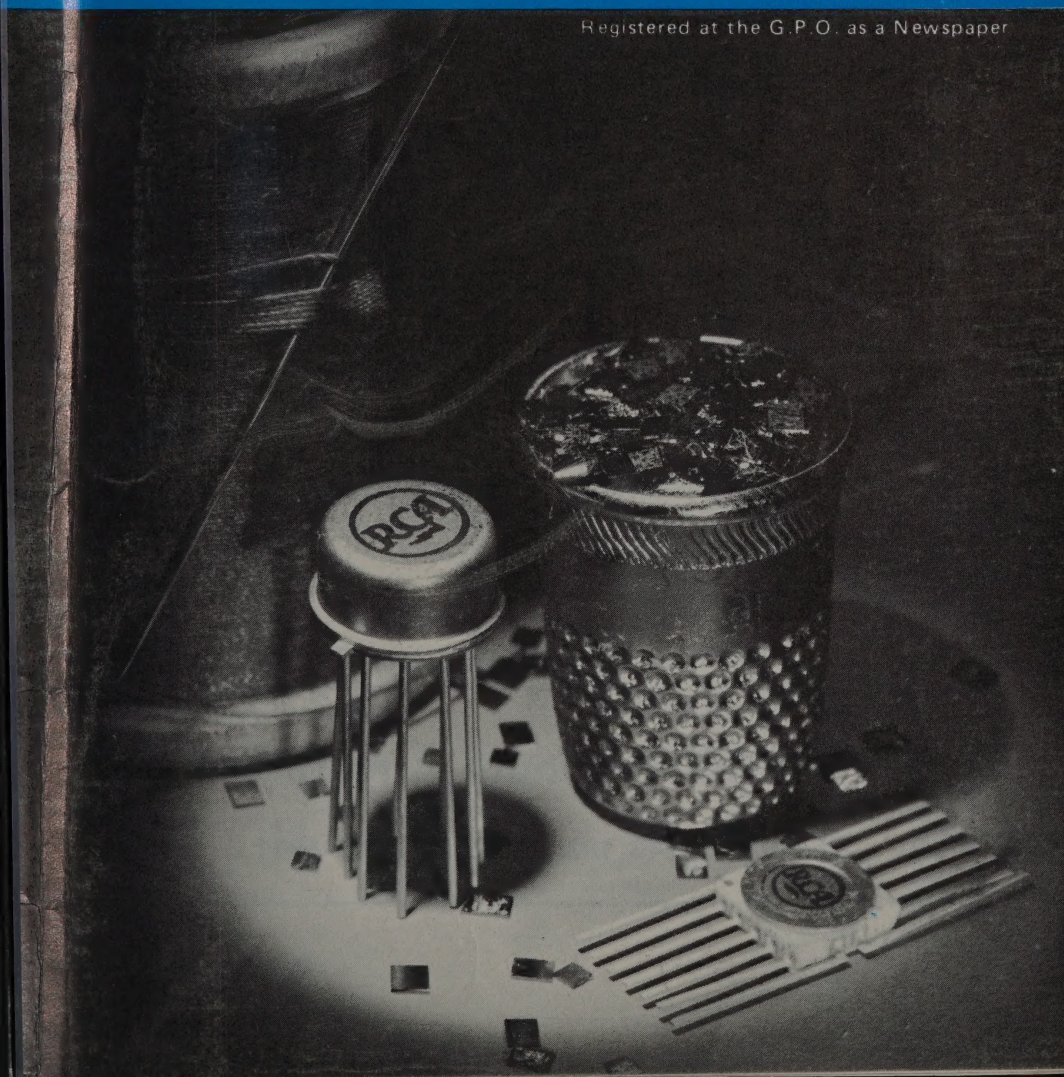

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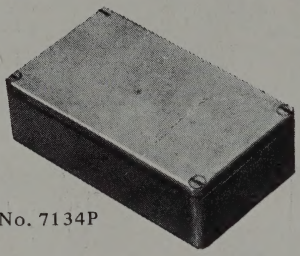

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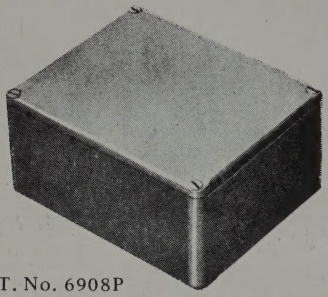

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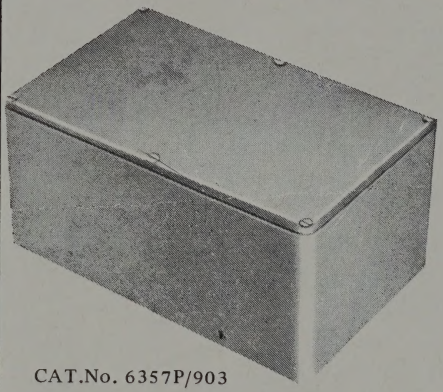

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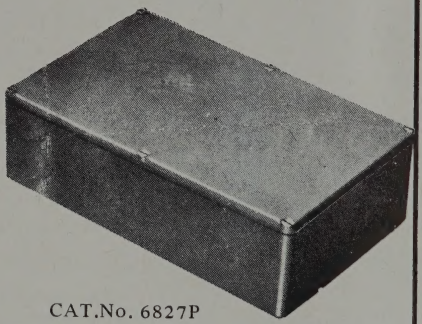

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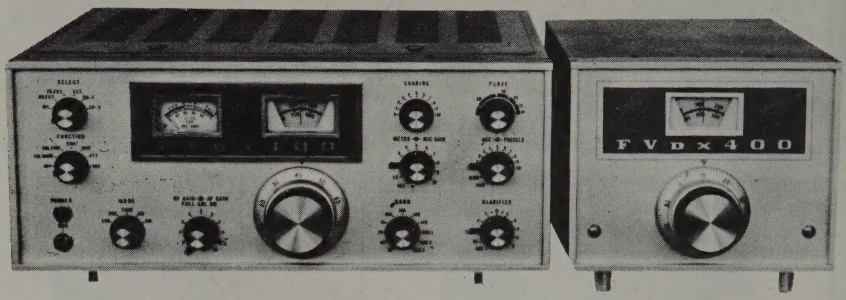

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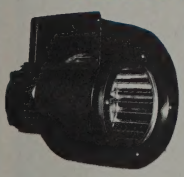

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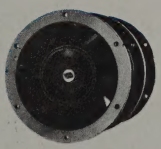

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Silent Key

KENNETH FRANCIS SCOTT
ZS1BV

Ken, as he was known to our Amateur Radio fraternity was born in 1888 in Cape Town, where in the years after the First World War he became interested in Amateur Radio. The early enthusiasts of these days, particularly the late Henry Rieder and the late J.S. Streeter helped him in getting on the air.

He was first licensed in 1921 as FO-A5H; this was changed to ZT1M and subsequently to ZS1BV, which he used to the time of his death.

He became a member of our league then known as the S.A. Radio Relay League, in 1926 and during his long period as a Radio Amateur remained a faithful and staunch adherent of our League.

His main interest in Amateur Radio in the post World War Two period was in DX operating on the 10, 15 and 20 metre bands. He was fortunate in his long years of retirement which he devoted almost entirely to operating and during which he became one of the best known voices from South Africa.

His passing on is regretted by his many friends both here in South Africa and throughout the DX world but our feelings of sorrow are tempered by the knowledge that he enjoyed a full and free life in his chosen sphere.

We offer our sincere sympathy and condolences to his son Douglas and daughter Barbara.

SOME LINEAR CONSIDERATIONS

by Henry Randall ZS5HF

One hears an awful lot about linear amplifiers these days and so perhaps a little more 'inside' information will prove of interest because the characteristics are somewhat different to those demanded of the conventional RF amplifier, though with the tremendous popularity of SSB the linear is fast becoming the 'conventional' RF amplifier.

What is a linear? In brief it may be described as an amplifier which may be fed a complex waveform and reproduce this waveform generally at higher level, with negligible distortion.

In that statement there are two points of interest which make the linear different from any other RF amplifier – namely . . . . . 'complex waveform' . . and . . .'negligible distortion' . . .

The common RF amplifier (Class C) is driven, in the main, by a regular waveform (sinewave), but it produces quite a high degree of distortion – a point which is of no consequence when we are only concerned with carrier generation but of considerable importance if we are concerned with the transmission of intelligence in the form of multitone modulation – speech, music or any such 'programme' material may be classed as multitone modulation.

The tests for Hi-fi amplifiers include distortion measurements not only with sinewaves but also with squarewaves and as a test the squarewave one is the one of by far the most import. The fidelity of an amplifier is determined by its ability to switch from one wave-shape to another. If an amplifier is unable to 'follow' the rapid change in drive single shape then an average shape appears as the output – this average is of course distortion.

In audio work the presence of distortion is of little consequence (I can hear the cries from the audiophiles) from an interference point of view but at RF there is a very different story, for distortion in a linear, apart from being difficult to copy, completely defeats the whole object of SSB.

It is therefore hoped that the following will give some basic information relative to the design of linear amplifiers.

Perhaps the first point to be considered is the 'type' of amplifier that can be used for this type of service. Undoubtedly, for low power applications the class A is the obvious choice. It is an extremely inefficient mode of operation and hence it is restricted to low power applications, but it does have one very important saving grace and that is that it requires no power from its driving source. It is therefore a voltage operated device and never draws grid current. Class A amplifiers are used almost exclusively in receiver stages, both RF and AF and in most transmitters up to the final stages – at least in transmitters running less than about 200 watts input.

The class C amplifier, which is much higher in efficiency, is totally unsuitable for use as a linear, because the percentage of distortion which appears in the output is far too high, but where carrier only conditions exist,

such as in frequency multiplication, driving circuits and finals of AM and FM transmitters, the class C amplifier is the winner. A special point of interest here is that a class C amplifier is employed in the final stages of most commercial FM transmitters and yet modulation is applied in the very early stages. The point that we should remember in FM work is that the modulating signal does not take the form of modification of the RF waveform in, if you like, a vertical direction, but takes the form of causing the frequency to change and the class C amplifier is perfectly capable of amplifying a varying frequency – the only limitation being that the tuned circuits associated with the amplifier are designed so that they will have adequate band-pass.

The class B amplifier has deliberately been left to last because it is this type of amplifier which meets the requirements of economical high power and potential linearity. There are also various forms of class B amplifier, all of which have some specific advantage, but we need only concern ourselves with the general classification.

When class B amplifiers are used in audio amplifiers, it is always necessary to use two tubes under push-pull conditions. If this were not done, the distortion level would be extremely high because only one half of the signal is being amplified. In RF circuits a single tube is all that is required, on the assumption that power requirements are met, because the fact that the tube is working into a tuned circuit provides the "missing half" of the waveform by the inherent 'flywheel' action of such circuits.

The class B amplifier, regardless of the particular type of class B that it may be, basically draws low plate current under no drive conditions and high plate current when it receives drive. It will therefore be appreciated that in SSB Service there is no 'carrier' as such but that modulation will appear as pulses or spikes of RF. It is this 'pulse' type operation which determines the design of the power supply, but more about that later.

Unlike the class A amplifier, the class B can draw grid current – I say 'can' because whether it does or not will depend upon the type of class B amplifier that it is. The point however is made and that is that power can be drawn from the exciter and if distortion is to be avoided then the exciter must be able to deliver current as well as voltage.

As mentioned above a pulse type amplifier makes special demands on its power supply and fortunately the demands are generally less stringent than those required from class A or C stages. The class B amplifier is a type of pulse amplifier and therefore the peak power is high and the average power is relatively low and as far as voice modulated pulse amplifiers are concerned the average power runs in the vicinity of 30 percent of the peak power. This is an immediate advantage over the power supply required to drive say, an AM Phone transmitter because we do not have to provide power for the carrier and the carrier provides nothing in the way of intelligibility.

It should be remembered that the peak power that any stage is capable of delivering is the same regardless of whether the drive signal is

QSY page 8

Silent Key

It is with great regret that we record the passing away of old timer MAC ZS6EC on the 1st October 1969.

His passing leaves a gap in the ranks of the old timers who helped to build up true Ham Spirit among the members of the East Rand Branch of the SARL.

His CQ calls on CW and AM will be sadly missed by his many friends all over the world.

At the age of 62 OM Mac had been a Ham for 46 years, having operated from Johannesburg, Germiston, Durban, Benoni and Northmead.

Among his other hobbies, he had a keen interest in the Scout Movement, for which he held the long service medal for 44 years service. Among other things he was always willing to play his part in Air Displays, Madigras, Hamfests and other Festivals.

To his family and relatives we offer our sincere sympathy. A KEY HAS GONE SILENT, and ANOTHER LOG BOOK HAS CLOSED.

BANDVERSPREIDING VARACTER

Cl = 10pf. Ontvangstelle wat alreeds 'n mate van bandverspreiding het kan Cl 2pf gemaak word of net een diode kan gebruik word. As die RF ossilator spanning hoër as 15 volts is dan moet Cl kleiner gemaak word.

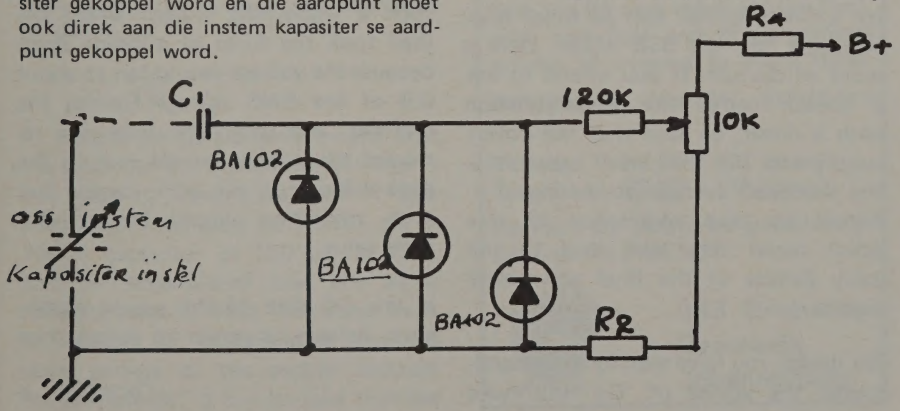
Cl moet direk aan die ossilator instem kapasiter gekoppel word en die aardpunt moet ook direk aan die instem kapasiter se aardpunt gekoppel word.

Rx B+	Rx oss Spanning	Aantal Diodes	R2ohms	R4
180v	15v	3	680	47k
120v	15v	3	560	47k
12v	2v	3	6.8	—

Met transistor ontvangstelle is Cl = 47pf.

Die lok lin verstelbare weerstand kan enige afstand van diodes af wees.

ZS.1.MM Stroombaan versameling.



SOME LINEAR CONSIDERATIONS

continued from page 6

speech or carrier – the fact that one can often obtain a greater output from an amplifier operating SSB is because the average dissipation is low, but the actual peak power, if one heeds the tube parameters is the same. However the demands placed by the stage on its power supply are very different for CW and SSB service.

Take the case of an amplifier being driven by a carrier for 1 second and let us assume that the stage is being driven to peak conditions and also that the current drawn from the supply was 500 mA. If we now drive the same amplifier with a two-tone test signal as is standard practice when measuring the parameters of SSB transmitters, and we drive the stage to peak output, we will find that the registered cathode current will only be 350mA – this being the average current. It will immediately be apparent that the power supply requirements are now only about 70 percent of what they were. In actual fact the conditions imposed on the power supply by the two-tone test are extremely rigorous and in practice a power-supply capable of delivering slightly less than 50 percent of the current ratings required by a CW amplifier will be more than adequate for the SSB linear. Here a word of caution. If you intend to use a speech compressor in conjunction with a linear, be sure that the power supply and the final itself can handle the increased average power input – failure to take cognisance of this point could very well lead to the early demise of the final and power supply.

No doubt you have seen in some handbooks the advise of 'Do not make prolonged whistles into the microphone for test purposes'. Well the reason is as stated above.

The fact the class B stage draws low current under no drive conditions gives the advantage that better utilisation may be of the output voltage from the power transformer. You have probably noticed that most power supplies for linears use bridge rectifiers with highly capacitive filters, and this type of circuit has the advantage that the filter capacitor will be charged to very nearly the peak value of the supply voltage – depending upon the quiescent load – whereas in normal full-wave circuits the available Dc voltage is approximately 0.9 of the RMS voltage feeding the rectifier.

Mention has just been made of the large filter capacitor that one often finds in power supply units designed for linears. In actual fact when a large capacitor is used as the only smoothing device it is more accurate to call this capacitor will store considerable energy and providing that the load is intermittent – as it is in pulse operation – it will be possible to draw large currents without the voltage dropping materially.

It would not be satisfactory to use such a smoothing system where the load took the form of a steady drain because the voltage would fall to about 0.9 of the RMS voltage feeding the rectifier, and when the load was removed the voltage would soar to the peak value. You can well imagine that such regulation would be of very little value.

If the DC side of the power supply must deliver its power in pulses then

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so must the AC to a certain extent. Some rectifiers are excellent for this purpose and some are not so hot. For example silicon rectifiers have excellent properties in this direction because of their extremely low forward resistance, whereas the vacuum tube is not so clever because it has an inherent high internal resistance. Mercury vapour rectifiers are a cross between silicon and vacuum tube rectifiers but have the tendancy to generate interference unless special precautions are taken. Selenium rectifiers are not suitable for this type of service.

It will be realised that if a large value of resevoir capacitor is employed, the surge power on "switch-on" and even under normal operation can be high. It is therefore a good plan to provide some form of series resistance to limit the surge current (see figure 1). The value of the surge current will be dependant upon the reactance of the resevoir capacitor at 100 c/s and the peak value of the supply — in actual fact the inherent resistance of the rectifiers and transformer windings will also come into play, but these resistances are so low that I prefer to ignore them in calculations of this type. The surge current may therefore be said to be:

$$I = \frac{Vpk}{Xc\ Res.}$$

It should be particularly noted that the surge current can be many Amps — this will be readily realised if you study the reactance curves of say a 100uF capacitor at 100 c/s. It must also be remembered that any series resistors used to limit this surge must be capable of withstanding the full peak voltage of the supply because on "switch-on" it can be said that the reactance of the filter is virtually nil.

It is also important that the wattage be adequate to handle the surge — it not being necessary to use a resistor which will handle the surge on a continuous basis, but is does preclude the use of carbon resistors in virtually every instance.

Another method of controlling the surge would be to use a variac or some such device to gradually increase the voltage applied to the primary of the power transformer and no doubt there are many other methods as well.

continued next month.

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Contacts may be made on different modes on each band.
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Mr. J. N. Knowles, VE4JK,
P.O. Box 365, Carman, Manitoba, Canada.

by Colin Duff ZS1CA

TUBE/TRANSISTOR SUBSTITUTION GUIDE. (TAB BOOK No. 525)

This manual, published in March 1970, is a brand new updated edition of this well known guide, containing 40% more material and includes the newest popular tube and transistor types. Only readily available and comparatively priced substitutes are listed — no longer is it necessary to search through lists of tubes and transistors rarely seen in use, or search through pages of irrelevant material to find a substitute.

This volume contains 8 sections — four devoted to tubes and four to transistors. Section 1 provides a cross-reference of popular American receiving tubes, listing substitutes which have similar or superior characteristics and which require no mechanical changes or circuit modifications. In each case the best substitute is listed separately from others that can be used. Section 2 lists substitutes for popular tube types found in commercial and industrial equipment. Again, the most appropriate substitute is identified. American substitutes for popular foreign types are presented in Section 3, while Section 4 includes base diagrams keyed to the tube listings in each section.

The transistor portion begins with Section 5, which contains a complete listing of popular American types and the most readily available popularly priced substitutes. Section 6 lists American substitutes for the most often encountered foreign transistors. Section 7 is a listing of general purpose replacements for popular original types. For the purpose of lead identification, Section 8 includes base diagrams which are keyed to the original type listings, thus enabling the proper identification of emitter, base, and collector terminal leads.

This is a handy edition especially if you deal exclusively in American tube or transistor types.

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Republic of South Africa.

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Eligible Contacts :

(1) Any member of the Pretoria Branch of the SARL (this includes country members at several locations in the Transvaal);

(2) Any ZS6 amateur station with a QTH in Pretoria or the adjoining towns of Lyttelton, Verwoerdburg, Irene, Silverton, Bapsfontein, and Bronkhorstspruit.

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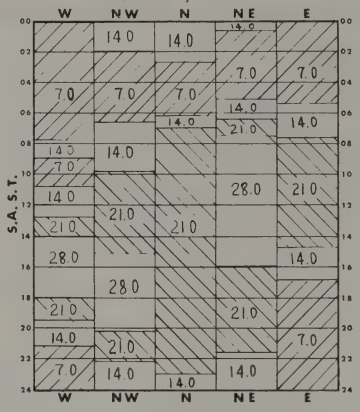
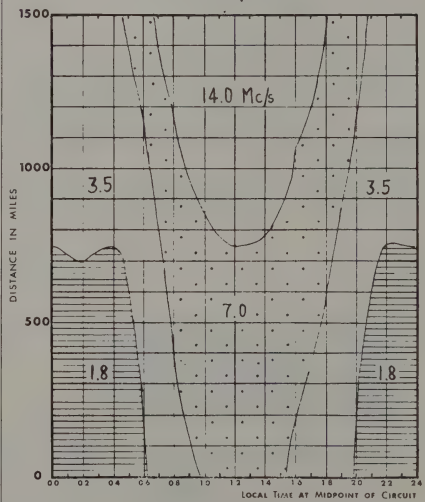
FREQUENCY PREDICTION CHARTS

AMATEUR FREQUENCY BAND SELECTION CHART
FOR CIRCUITS OF LENGTH 6000 MILES IN DIFFERENT DIRECTIONS FROM JOHANNESBURG
AUGUST, 1970



NATIONAL INSTITUTE FOR TELECOMMUNICATIONS RESEARCH, C.S.I.R.

AMATEUR FREQUENCY BAND SELECTION CHART FOR SOUTHERN AFRICA
AUGUST, 1970



NATIONAL INSTITUTE FOR TELECOMMUNICATIONS RESEARCH, C.S.I.R.

'n Toekomsbeeld van
MIKRO-ELEKTRONIKA IN SUID-AFRIKA

Dr. H.C. Viljoen, ZS1HC.

Die eksponensiële groeitempo in die kompleksiteit en omvang van elektroniese apparaat wat moet voldoen aan die steeds strenger vereistes van die hedendaagse tegnologie, het tot gevolg gehad dat die benuttiging, hoë koste, lae betroubaarheid, fisiese afmetings en die werkverrigting (by steeds hoër frekwensies) van elektroniese stelsels wat gebruik maak van diskrete (ektiewe en passiewe) elektroniese baankomponente, geheel-en-al onvoldoende is. Alhoewel die transistor sedert die vyftigerjare tot 'n groot mate daarin geslaag het om hierdie probleme te minimeer, was 'n verbetering van etlike grootte-ordes in die komponentdigtheid, drywingsdigtheid en fisiese afmetings van die geleiers in elektroniese toerusting noodsaaklik, en wat sedert die begin van die sestigjare die ontwikkeling van die mikro-elektronika (en meer bepaald die gebruik van geïntegreerde bane) tot gevolg gehad het. Hiermee kon hele stroombane en (tans) hele elektroniese stelsels — in plaas van slegs individuele baankomponente — in 'n enkele proses vervaardig word.

Die daarstelling van geïntegreerde stroombane tydens die afgelope dekade is besig om 'n revolusie op die gebied van die elektronika te veroorsaak, die invloed en gevolge waarvan veel groter en omvangryk is as dié wat met die koms van die transistor self onder vind is. Tewens, die elektronika staan tans voor ontwikkelinge van ongekende omvang wat die hele vakgebied as sulks op 'n ingrypende wyse sal verander. So is dit tans moontlik om baanopstellings te realiseer waaroor vroeër maar slegs gespekuleer kon word, en waarvan die girator, die mutator, die reflektor, die skalor en die verskillende negatiewe impedansieomsetters voorbeelde is. Elkeen van hierdie nuwe elektroniese „baankomponente" is alleenlik realiseerbaar met behulp van geïntegreerde stroombane, en dit is noodsaaklik dat die ingenieur van die toekoms 'n deeglike kennis moet dra van die eienskappe, moontlikhede en toepassing van elkeen van hulle. Die elektrotegniese ingenieur van die toekoms se basiese boustene is dus veel meer as dié van sy voorganger, wat met die weerstand, die kapasitor induktor en die transformator (as passiewe komponente) kon wegkom.

Dit is duidelik dat daar ook wat universiteitskursusse betref, belangrike aanpassings moet kom om ingenieurs voor te berei vir die mikro-elektroniese era. Die noodsaaklikheid hiervan word veral weerspieël in die groeitempo van die eie Suid-Afrikaanse elektroniese vervaardigingsnywerheid: vir die tien jaar vanaf 1958 (toe die jaarlikse omset nul bedra het) tot 1968 het die totale omset van die Suid-Afrikaanse elektroniese vervaardigingsnywerheid R52 miljoen bedra: die verwagte omset vir die jaar 1969 alleenlik is R24 miljoen, d.w.s. bykans die helfte van die totale bedrag van die voorafgaande tien jaar. In hierdie verband kan verwag word dat 'n soortgelyke situasie as in die V.S.A. sal ontstaan, waar die elektroniese nywerheid vanaf 'n 72ste plek in 1939 op die rangorde van nywerhede tot 'n vyfde plek in 1958 en 'n derde plek in 1968 gevorder het! Tans bedra die jaarlikse omset aldaar

20 biljoen dollar, en maak geïntegreerde stroombane reeds 30% van die totale omset uit (en word hierdie persentasie jaarliks vergroot).

Mikro-elektronika tegnieke

Tans word daar hoofsaaklik van twee basiese tegnologieë gebruik gemaak vir die vervaardiging van mikro-elektroniese stroombane, nl.:

(i) Die tweedimensionele benadering wat berus op die presisie-beheer van die dikte, struktuur en chemiese samestelling van dun films van geleidende, isolerende en halfgeleier-materiale d.m.v. opdamping katodiese neerslag (elektroliese) of epitaksiale groeiprosesse op 'n glas (of ander) substraat as basis. Dit gee aanleiding tot DUNFILM elektroniese bane (wat die vroeëre dikfilmbane verdring het.)

(ii) Die driedimensionele benadering berus op die transistor-tegnologie, waarin nie slegs die transistor-diode funksies nie, maar ook die passiewe baankomponente (weerstande en kapasitore veral) se funksies binne 'n ENKELE VOLUME van halfgeleiermateriaal vervaardig word. Hierdie monolitiese geïntegreerde stroombane vorm tans die basis van die hele mikro-elektroniese nywerheid en wetenskap.

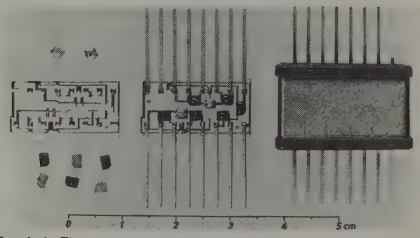


Fig. 1: 'n Tipiese dunfilmbaan. Links word die dunfilmbaan (wat die weerstande en tussenverbindings lewer) en die agt diskrete transistors getoon. In die middel is die transistors vasgeheg aan die dunfilmbaan, en regs verskyn die voltooide mikroelektroniese dunfilmbaan.

Dit is nuttig om hierdie twee benaderings vlugtig van naderby te beskou:

Dunfilmbane

Die dunfilmtegniek is hoofsaaklik 'n hibriede metode waarin dunfilmtegnieke vir die vervaardiging van die weerstande en die tussenverbindings van 'n elektroniese baan gebruik word, terwyl die aktiewe baankomponente (transistors, diodes, ens.) en alle kapasitore (en tot 'n mindere mate ook induktore) as diskrete elemente daarop vasgeheg word. Verwys na figuur 1. Basies bestaan die proses uit die gebruik van 'n glas-substraat waarop alternatiewe legies na nichroom (vir weerstand), 'n isolerende laag, en nikkel (vir die verbindingsdrade) neergeslaan word. Hierna word die gewendse dele van die filmlagies d.m.v. 'n fotografiese proses gemasker, en die ongewensde dele deur etsing verwyder. Die diskrete aktiewe baankomponente en kapasitore word d.m.v. 'n soldeerproses op die gewensde plekke aangebring.

Hibriede dunfilmbane is in staat om onder uiterstes van elektriese werktoestande (hoë temperatuur, lugdruk en humiditeit) te funksioneer, en is derhalwe geskik vir hoë drywing, hoë frekwensie (tot die mikrogolfgebied) skakelings. Hierdie aspek is veral van belang vir militêre doeleindes.

Die metodes laat die realisering van bane van groot kompleksiteit toe, en die tydsverloop tussen die finale prototipe en die produksiestadium is gering (etlike weke). Verder word die

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metode gekenmerk deur 'n besondere elastisiteit tydens die ontwikkelingsperiode, en kan die baanopstelling maklik en sonder veel omhaal gewysig word.

Dunfilmbane is geskik vir die kleinskaalse vervaardiging (etlike dosyne) van elektroniese bane op 'n ekonomiese grondslag, en dit is veral geskik vir nie-standaard tipe van skakelings. Daarbenewens is die koste verbonde aan die daarstellinga van 'n produksie-fasiliteit vir dunfilmbane gering (bereken op 'n totale bedrag van R50,000, insluitende geboue.

Die metode is ongelukkig vir die grootskaalse vervaardiging van elektroniese bane, waarvoor monolitiese tegnieke vir hoeveelhede van 10,000 en meer verkieslik is. Die bane se relatiewe groot fisiese afmetings (25 cm x 8 cm x 1 cm) maak dit ook ongeskik vir 'n hoë komponentdigtheid.

Monolitiese geïntegreerde stroombane

Verreweg die vernaamste geïntegreerde stroombaantegniek (veral vir die afsienbare toekoms) berus op die driedimensionele benadering waarvoor uitsluitlik gebruik gemaak word van monolitiese vervaardigingsmetodes (d.w.s. maskering van die halfgeleierskyfie, die indiffusering van onsuiwerhede om en P en N tipe halfgeleiermateriaal te verkry, en die neerdamping van geleiers en isolators om 'n driedimensionele struktuur van alle baankomponente op te bou.) Sien fig. 2.

Die lae vervaardigingskoste (40 tot 50 sent vir 'n baan bestaande uit 'n honderd afsonderlike baankomponen-

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AMENDMENTS TO CALLBOOK No.22

* ZS2EY	Eric W. Voogt, 20 Maple Avenue, Buffalo Township, East London.
* ZS3BS	P.A. Swart — delete — see ZS5AR.
* ZS3QA	A.P. Burger, Technical Division, c/o Postmaster, Keetmanshoop, SWA.
* ZS5AR	P.A. Swart, 24 Kilham Road, Empangeni Rail, Natal.
* ZS5CP	P.C. Robertson, 68 Molweni Road, Everton, Natal.
* ZS5ND	D.L.G. Bernard, 381 Bulwer Street, Pietermaritzburg, Natal.
* ZS5OJ	D.B. Logan now ZS5ON.
* ZS5OV	B.P. Robson-garth, 113 Aberfeldy Road, Westville North, Natal.
* ZS6ALJ	D.J. (Pottie) Potgieter, Cathcartstraat 38, Stilfontein, Tvl.
* ZS6AWU	D. Hellyar, 309 Trichardt Road, Parkdene, Boksburg, Tvl.
* ZS6BDT	K.L. Schutte, 29 North Street, Mafeking, C.P.
* ZS6BJE	J.C. Scholtz, 5de Straat 42, Delmas, Tvl.
* ZS6PB	F.J. Potgieter, Privaatsak 88, Pretoria, Tvl.
* ZS6PY	Dr. P. Botha, 2de Single No.11, Vredelus, Bellville, KP.
* ZS6SP	N. Swerdlow, 16 San Michele, 46 Louis Botha Avenue, Highlands North, Jhg.
* ZS6TY	C.T. Christodoulou, 350 Church Avenue, Lynnwood, Pretoria.
* ZS6XB	D. Daniler, P.O. Box 6973, Johannesburg.
* ZS1AU	Dennis Wells, c/o Chief Technician, C.P.O. Workshop, Blackwood Road, Hamilton, Bloemfontein. (Incorrect in Radio ZS — June issue).

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te) is een van die vernaamste voordele van die metode. Dit lewer 'n veel groter langtermyn-betroubaarheid as wat met enige ander metode verkry kan word, en wat veral in groot elektroniese stelsels (bv. rekenaars) van belang is.

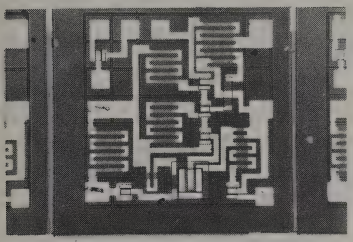

Fig. 2: 'n Enkele geintegreerde stroombaan wat met behulp van monolitiese tegnieke vervaardig is. Hierin word alle baankomponente, dws. beide passief en aktief van aard, op 'n enkele skyfie halfgeleiermateriaal vervaardig. Die skyfie is hier 'n paar honderd keer vergroot.

Die metode word verder gekenmerk deur die klein fisiese afmetings van die eindproduk; die komponentdigheid is veel groter as wat met bv. dun — filmtegnieke verkry kan word.

Dit is reeds genoem dat monolitiese geintegreerde stroombane die daarstellinga van nuwe boustene vir die elektroniese ingenieur (die reedsvermelde girator, mutator, reflektor, skalor, ens.) moontlik maak. Hierdie aspek as sulks oefer 'n baie groot invloed uit op die ontwikkeling van die elektronika vir die toekoms.

Die vernaamste nadeel van die monolitiese tegniek is die feit dat dit tot onlangs slegs gebruik kon word vir die grootskaalse produksie van standaardtipe elektroniese bane, soos veral aangetref in digitale tegnieke (waarvoor daar ongeveer slegs 'n dosyn verskillende baanopstellings nodig is vir die realisering van alle funksies). Die toepassing van monolitiese tegnieke vir liniêre stroombane was tot onlangs beperk tot die gebruik daarvan vir enkele "standaard" tipe skakelings, soos bv. die operasionele versterker, maar ook hierdie prentjie is vinnig besig om te verander. Voorheen was produksiehoeveelhede van 100,000 nodig voordat oorgegaan is tot monolitiese tegnieke; tans beskou een firma (Plessey) dat dit moontlik is om na monolitiese tegnieke oor te skakel vir produksiehoeveelhede van 500 van dieselfde skakeling, terwyl hulle voorsien dat dit in 1970 moontlik sal wees om monolitiese bane (i.p.v. diskrete of dunfilmbane) te gebruik wanneer slegs 6 bane van dieselfde tipe benodig word. Dit bring die moontlikheid van die integrasie van stroombane m.b.v. monolitiese tegnieke binne die bereik van selfs die kleinste vervaardiger.

Transistors by die duisende; die vingerhoed bevat 'n duisend geintegreerde stroombaan mikroskyfies, elkeen waarvan die ekwivalent van 32 baankomponente besit.

Vir die grootskaalse produksie van monolitiese geintegreerde stroombane is ongelukkig 'n groot kapitaaluitgawe nodig; dit word beraam op 'n aanvanklike uitgawe (geboue en toerusting) van R1 miljoen, met 'n jaarlikse bedryfkoste van R1 miljoen. Dit is die vernaamste rede waarom monolitiese vervaardigingsmetodes nog nie tot dusver

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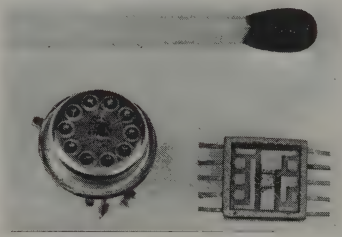
in Suid-Afrika toegepas word nie. Met die oog op strategniese oorwegings word dit egter voorsien dat sodanige fasiliteite binne die volgende twee jaar in S.A. voorsien sal moet word (moontlik met 'n Regeringsubsidie). Terwyl so 'n fasiliteit aanvanklik slegs gebruik sal word vir die massavervaardiging van slegs enkele tipes bane (en wat op 'n sterk uitvoermark sal staatmaak), sou die fasiliteit ook aan ander instansies (en klein ondernemings) beskikbaar gestel kon word vir die vervaardiging van hul eie bane.

In hierdie verband word voorsien dat selfs klein ondernemings in staat sal wees om spesiale geintegreerde bane (veral van die liniêre aard, waar standaardisering feitlik onmoontlik is vanweë die groot verskeidenheid van moontlike baanopstellings) by so 'n fasiliteit kan laat vervaardig. Dit ontwerp, ontwikkeling en sintese van so 'n baan sal deur die betrokke klein onderneming self onderneem moet word) insluitende waarskynlik ook die maskervervaardiging), waarna slegs die finale produksie deur die fabriek uitgevoer sal word, omdat alle vervaardigingsprosesse ná die maskerstadium identies is, Suid-Afrika beskik oor al die grondstowwe wat vir die vervaardiging noodsaaklik is, enis tewens een van die vernaamste voorsieners van hierdie grondstowwe.

Nie net is dit noodsaaklik dat S.A. om strategniese redes onafhanklik sal wees in hierdie verband nie, maar die meer gesofistikeerde militêre stroombane wat moontlik gemaak word deur monolitiese groote en laer koste daarvan, die groter betroubaarheid van sulke bane en die noodsaaklikheid van geheimhouding van elektroniese krygstuigtoerusting se werkverrigting dui alles op die noodsaaklikheid van so 'n fasiliteit. Terwyl so 'n fabriek aanvanklik gesubsideer moet word, sou dit in die lang duur sy dividende dubbeld en dwars lewer. Tewens in die V.S.A. in die militêre owerhede tans die grootste enkele verbruiker van elektroniese toerusting.



Twee mikroskyfies, gemonteer in hul kannetjies, word hier vergelyk met 'n gewone vuurhoutjiekop. Die mikroskyfies self is die klein vierkantjies in die middel van die voetstukke waarop hul geplaas is. Die verbindingsdraadjies is haas onsigbaar in die foto hierbo.

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Q-CODE

Most amateurs have already at one stage or other come into contact with the Q-code as it is known. For those of us who have not, The International Q-code helps in the exchanging of C.W. messages between different nationalities. Below are a few of the Q-signals.

QRK What is the readability of my signals? The readability of your signals is R . . . . . .

QRT Shall I close down? I am closing down.

QRU Have you anything for me? I have nothing for you.

QRV Are you ready? I am ready.

QRX When will you call me again? I will call you again at . . . . . GMT.

QRZ Who is calling me? You are being called by . . . . . .

QSB Are my signals fading? Your signals are fading.

QSL Can you give me acknowledgement of receipt? I give you acknowledgement of receipt.

QSO Can you communicate with .? I can communicate with . . . . .

QSX Will you listen for . . . . . (call sign) on . . . . . .Kc? I am listening for . . . . . on Kc.

QSY Shall I change Frequency? Change Frequency to . . . . Kc.

QTH What is your location? My location is . . . . . .

QTR What is the exact time? The exact time is . . . . . .

All Q-signals take the form of questions only when followed by a question mark.

Those are the more common Q-signals. The rest of the code is as follows.

QRA What is the name of your station? The name of my station is . . . . . .

QRB How far are you from my station? My approximate distance is . . . . . .

QRD Where are you bound and where are you from? I am bound for . . . . . and from . .

QRG Will you tell me my exact frequency in Kc's? Your exact frequency is . . . . . Kc.

QRH Does my frequency vary? Your frequency varies.

QRI Is my note good? Your note varies.

QRJ Are my signals weak? Your signals are too weak.

QRL Are you busy? I am busy, please do not interfere.

QRM Are you being interfered with? I am being interfered with.

QRN Are you troubled by atmospherics? I am troubled by atmospherics.

QRO Shall I increase power? Increase power.

QRP Shall I decrease power? Decrease power.

QRO Shall I send faster? Send

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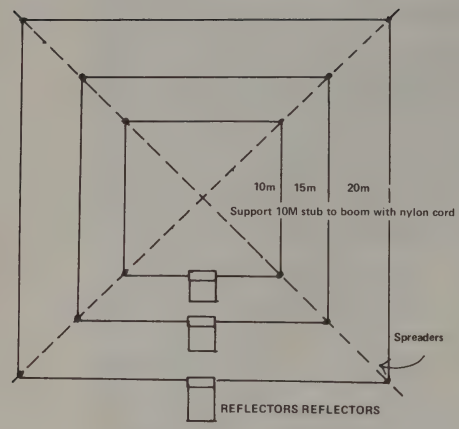
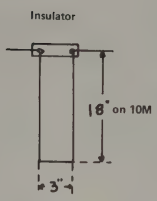
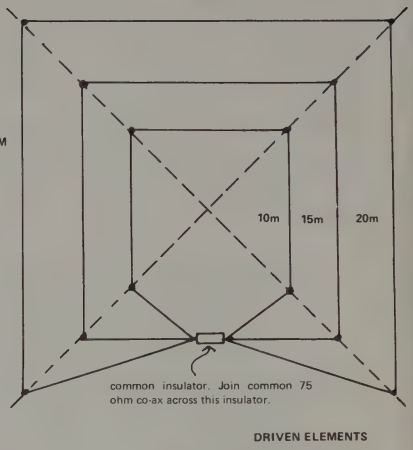
THE G3NUG TRI-BAND SINGLE FEED QUAD.

by P. v. Niekerk, ZS410







Sketch 1 **Sketch 2**

Q-CODE

continued from page19

faster (. . . . wpm.)

QRS Shall I send slower. Send slower (. . . . wpm.)

QRW Shall I tell . . . . . that you are calling him on . . . . Kc? Please tell . . . . . that I am calling him on . . . . . Kc.

QSA What is the strength of my signal? The strength of your signal is . . . . . (S1-9).

QSD Is my keying correct? Are my signals distinct? Your keying is incorrect. Your signals are bad.

QSM Shall I repeat the last message I sent you? Repeat the last message you sent me.

QSP Will you retransmit to . . . .? I will retransmit to . . . . .

QSV Shall I send a series of V's? Send a series of V's.

QSZ Shall I send each word or group twice? Send each word or group twice.

Submitted by Farrell Segall, ZS1-238.

MOBIELE MIKROFOON BESKERMING

Laat jou motor se vensters 'n entjie oop. Indien die motor se deur met al die vensters toe, hard toegeslaan word, kan die saamgeperste lug wat so gevorm word, 'n sensitiewe mikrofoon beskadig.

Chris Jacobs ZS4LM

ALL HAMS ARE BRAGGARTS!

de ZS1ACD — Max Adler

With that opening salvo, retreat into my shelter is necessary until the obvious rain of abuse my title will provoke subsides and reason prevails. Whereupon all hams must agree with my statement. But don't worry — I could just as well have said that all humans are braggarts, for this applies generally.

From time to time little Johnny horrifies his mother by riding his cycle and saying "Look, Ma, NO HANDS! " you can be sure he has joined the ranks. Doting mothers break their necks to get their little Janie's into the school play so they can brag "She's MY daughter! "Proud fathers, when junior gets A's at school, buys drinks all round so HE can boast "That's MY boy! " So what has that got to do with hams? Read further, brother ham, read further.

What ham can deny that, having hooked that ultra-rare dx station, he does not bust a gut to call all his mates and tell them about it. How many hams do NOT send out qsl's by the hundred? Yes, friends, it's perfectly normal to brag about our achievements and when we have proof of this, how much better it is to show this proof to all and sundry. In the case of ham radio it is the qsl card that is used as proof — but it might just as well be that cup you got for winning a dx contest, a golf tournament, any other competitive event, or even a booby prize in the local darts game. See now what I mean by my title?

So, if you really want something to boast about — why not go awards hunting? Which will also provoke much mirth amongst the anti-awards brigade. Yet how many of those are proud to display their DXCC or RCC certificates. Take it from me — we're all tarred with the same brush to some extent or other. And I am guilty of this to a large degree for I am a confirmed "Sheepskin" chaser. My 200 odd certificates prove this (there I go, brag, brag, brag) but, and this is a big but, in chasing my sheepskin I've had a lot of fun, believe me. It has cost me many hours of work checking through seemingly interminable lists, checking and counter-checking qsl's, scanning the ham bands for that last qso needed for this, that or the other award — time spent writing out applications — money — frustration at delay of something or other — all this has been my lot yet it HAS been fun and has made me many more ham friends than expected. My ham correspondence increases every week and it becomes more and more difficult to find time for this each day — but somehow it all gets done.

At one time the DXCC was all I wanted — then a casual remark by Marge, ZS1RM, about a club called CHC — the CERTIFICATE HUNTER'S CLUB — set me off on a journey which is never-ending — a journey where I am constantly meeting friends, old and new, bound on the same course and enjoying the same travels and travails as myself. There is another item to discuss on the air — have you heard of this award? Where do we apply for that award? How? Where? When ? Are you still with me, brother hams ? Why not get yourself an awards directory and see for yourself what a vast activity is encompassed by the awards field. You'll be surprised — and when you see the member list of the "top" ham clubs throughout the world you'll be even more surprised at who IS an awards hunter. If the awards bug bites you, brother, are you going to have fun.

QSY Page 22

INTERNATIONAL AMATEUR RADIO JOURNALISTIC SOCIETY

Through several years' changes, IARJS's "purposes" have evolved as that "to encourage the writing — talking — and photographing of amateur radio activities. To better public relations between the radio amateur and the general public. To recognize the editor of the amateur radio club paper or bulletin as an important member of the amateur radio club operation. To encourage radio amateurs and non-amateurs as lecturers in a public relations programme promoting amateur radio's welfare. To speed up the dissemination of local amateur radio news to all parts of the world via an IARJS publication exchange programme. To advise on matter of publication formats. To aid those who desire to write an amateur column for their local newspaper. To bring together through a common medium of interest and activity and under whatever classification of IARJS membership, those who are Editors, Publishers, Columnists, Associate Editors, Writers, Public Relations, Printers, Authors, Photographers, etc., as related to the art and science of journalism as a whole."

FULL MEMBERSHIP is open to all licenced radio amateurs of any country who have a sincere interest in promoting amateur radio's welfare and who fall into any classification shown upon IARJS's membership application form as approved for use by the Board of Directors.

JUNIOR MEMBERSHIP is limited to persons under the age of eighteen years.

ASSOCIATE MEMBERSHIP is limited to persons who do not possess an active amateur radio operator's licence.

HONORARY MEMBERSHIP shall be limited to those so voted Honorary membership without dues by the Board of Directors.

IARJS is a non-profit, non-commercial, Amateur Radio Fraternal-Service Journalistic Society. DIALOG is the bi-monthly publication of IARJS whose address is P.O. Box 13522, Tampa, Fla. 33611, U.S.A. Membership includes subscription to Dialog — non-members can subscribe at the rate of $3.00 per year, or 50c per copy, payable in US dollars or IRC at rate of 10 IRC = $1.00. DIALOG material may be reprinted if credit given to author and DIALOG. Annual membership fee for non-U.S. citizens is $3.00 per year. Non-U.S. citizens may obtain Life Membership on payment of $25.00.

ALL HAMS ARE BRAGGARTS

continued from page 21

Are you frustrated when, having a free night for DXing, the bands are flat and there isn't a peep to be heard. That's the time to take up your pen, paper and lists and start work on awards. Keeps you busy, refreshes your memory on qso's you have forgotten and, you'll find, provides you with an added interest in ham radio for, as mentioned those dull nights when DX is "non est".

Good luck, brother ham, write me some time and let me know how you're doing — will be happy to swop yarns with you, let you brag to me so I can brag to you and we can spend many happy hours confirming that ALL HAMS ARE BRAGGARTS !

Western Transvaal Branch new address will be:

c/o Officer Commanding,
North Western Command,
Signal Squadron,
Military Base,
POTCHEFSTROOM.

F.H.C. — FLYING HAMS CLUB

The FHC was founded by and sponsored by the publisher of the Directory of Awards & Certificates. The FHC is an international amateur radio fraternal and service organisation with purposes, among other, of :

1. Bringing to the public attention nationally and internationally the significant contributions flying hams make to improvements in the art and science of both aeronautics and communications development.
2. Supporting the seven stated purposes of the international CHC.
3. Chartering flying hams "squadrons" to facilitate local organisational activity.
4. Promoting greater amateur radio interest in aeronautical mobile operations on all bands and modes.
5. Joining with CHC in operating "CHC-FHC Service Nets" on all bands and modes.
6. Joining with CHC in support of "CHC FHC Annual QSO party" for world-wide participation.
7. Joining with CHC in support of "CHC-FHC Annual Conventions".
8. Co-operating with other organisations having related programmes serving amateur radio and the public interest.

ELIGIBILITY FOR MEMBERSHIP IN FHC.

A. PILOTS :
Anyone who holds an amateur radio licence and who holds, or has held, a pilot's designation from ANY country is eligible for FULL membership.

B. CREW MEMBERS :

Anyone who holds or has held an appointment or assignment as an airborne electronics technician or communicator from ANY country is eligible for ASSOCIATE membership.

C. CLUB STATIONS :

The amateur radio club station of any army, navy or air force station or ship, part of the aeronautical forces of any nation may join FHC as a FULL member.

MEMBER APPLICATION (Official FHC form must be used).

A. US amateurs submit completed application form and $2.00 registration fee for LIFE MEMBERSHIP (no dues).

B. DX amateurs fee is $1.00 or 10 IRC's for the same as above.

C. Along with application, for various HQ records, provide 2 samples of your QSL card and 4 cards, 3"x5" giving name, Call, Qth, Birthday, Wedding Day and if member of CHC; OOTC; QCWA; Ai-Op; SSBers HSC; TOPS; FOC; SWL-CHC, give membership number. List all ex-calls and DX-P calls held. Also, attach resume of your flying background, occupation, family, other hobbies and items for possible use in news letters.

NOTE : FHCers are listed by Call/number for life in Directory of Certificates & Awards. Contacts with FHCers become credits for various amateur radio achievement awards *

NOTE : An attractive FHC membership certificate is issued and which is a CHC credit.

NOTE : Since FHCers pay no dues, there is no treasury and members corresponding with FHC HQ are expected to provide S.A.S.E.

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MEMBER SUBSCRIPTIONS :

Our members should have received the account cards for their annual subscriptions by now and while these cards have been sent from Headquarters office we wish to remind members that their subscriptions should be paid into their branch Treasurers or Secretaries. It saves both Branch and Head Office staff a lot of work if subscriptions are paid into the branch.

BOY SCOUTS JAMBOREE REPORT :

Jamboree-on-the-Air News :

12th Jota 1969 :

72 Countries are known to have taken part.
32 Countries have appointed National Organisers.

Most Active Countries were : —

Australia	430
USA	200
Great Britain	178
Canada	150
Sweden	100
South Africa	91
Norway	65

13th Jota : — will be held on 17th/18th October.

HB 9S is Boy Scout's World Bureau Station.

FT 500 Transceiver Th 3 Triband Beam Trap Dipole 40 & 80

Any ham who has not received his 1968 or 1969 Participation Card is asked to contact ZS6XK, A.H. Ritchie, 26 Cardigan Road, Parkwood, Johannesburg.

NEW AND RE—INSTATED MEMBERS :

We wish to welcome the following new and re-instated members to our ranks and hope they will be with us for many years :

ZS6-396	C. Engelbrecht	Cape Town Branch
ZE1CW	C.W. Warren	" " "
ZS3AV	A. v.d. Merwe	" " "
ZS1-050	L. Goldie	" " "
ZS1LA	J.B. Knol	" " "
ZS1-048	R.B. Besterfield	" " "
ZS1JO	J. O'Connell	" " "
ZS1LE	R. Fuller	" " "
ZS1-052	P.J. Selby	" " "
ZS1-056	D.B. Behr	" " "
ZS1-201	W.W. Bird	" " "
	D.J. de Waal-Rossouw, Jnr.	" " "

ZS5-008	J.R. Lorden	Durban Branch
ZS4JB	D. Brummer	Tak Vrystaat
ZS2AK	B. du Plooy	East London Branch
ZS6ALJ	D.J. Potgieter	Western Transvaal Branch
ZS5NO	D.L.G. Bernard	Pietermaritzburg Branch
	G.L. Branders	East Rand Branch
ZS2-009	C. Robertson	" " "
	Vallerie L. Wingreen	" " "

73,
HERMAN FORRER, ZS1FT

13th JAMBOREE-ON-THE-AIR

As previously announced, the 13th Jamboree-on-the-Air will be held over the weekend of the 17th/18th October 1970. Starting time will be 0001 GMT, on Saturday the 17th, and the event will terminate at 23.59 GMT on Sunday the 18th. Stations may, of course, operate for any period of time within these limits.

It is suggested that the official World Scout Frequencies listed below be used as calling frequencies only (i.e. for initial contacts only). After contact has been made, the stations concerned should move away (QSY) to continue their conversations.

80/75 meter band	– 3,590	CW;
	– 3,740	Phone;
	– 3,940	U.S.A. Phone
40 meter band	– 7,030	CW;
	– 7,090	Phone;
	– 7,290	U.S.A. Phone
20 meter band	– 14,090	CW;
	– 14,290	Phone.
15 meter band	– 21,140	CW;
	– 21,360	Phone.
10 meter band	– 28,190	CW;
	– 28,990	Phone.

HB9S – the new station of the World Bureau – will operate two complete stations for the full forty-eight hours of the event. The actual bands used at any one time will, of course, depend on prevailing conditions, but the stations will keep as closely as possible to the above frequencies, with operation being mainly on phone (SSB).

F.H.C.– FLYING HAMS CLUB

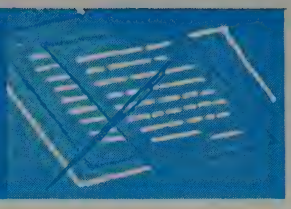
continued from page 23

FHC NEWS : FHC news is carried in Xtra news letter available upon subscription for $2.00 or 20 IRC per year. Calls for new FHC members are announced weekly on the FHC-CHC Service Net on 14340 at 2000GMT Sundays. Net opens 1800GMT daily. Check in and meet the many FHCers and CHCers who participate with this service/fun net.

For official member application form write to

Executive Sec. FHC,
Clif Evans, K6BX,
3212 Mesa Verde Road,
Bonita,
Calif. 92002
U.S.A.

letters to the editor



39, Willet Street, Newton Park,
Port Elizabeth. 4th June 1970.

The Editor "Radio ZS",

Dear OM,

I am an indulger in statistics and cannot help it but compare at times figures in certain aspects of Amateur Radio. For example I took the first S.A.R.L. Call Book Volume 1 Number 1 issued in September 1931 and traced the listed Division 2 Oms as best I could by referring to the latest S.A.R.L. April 1969 Call Book.

It was found that of those listed in that first Call Book only 2 amateurs originally in Port Elizabeth are active today. That is Roy ZS2L and myself. I am pleased to record that Bob ZS2BJ is active nowadays in Port Elizabeth but he figured under the East London boys those days. I attach a list of remaining and ex Division 2 Amateurs as their calls appeared in that first Call Book (their present calls are in brackets) and the operating frequencies of some of the chaps as I had it logged, hi !

In the last few months I have been active in 10, 15, 20, 40 and 80 metres and have made fresh acquaintances with some of these old timers whose names appeared in that first Call Book. I am keen to hear from (by radio or post) or about OM Kovachi ex ZS2G that grand old man of Amateur Radio in Port Elizabeth. I wonder whether he is still active and would be pleased to hear what his new call sign is, if he is still active.

Also, just for the record, I must say that conditions have been very good this summer season as I came back on the air on 24.1.70 and made W.A.C. on 20 metres from 1750 to 2045 S.A.S.T. The same feat in the old days, due to lack of activity of the required stations of course, took me 6 years to accomplish, hi ! To crown it all I worked DXCC, mostly phone (SSB) in exactly 3 months whereas it took me about 20 years previously to work, and of course, collect the QSL's to qualify for my DXCC Certificate. Such is Amateur Radio.

73 to all, I remain.
Fraternally,
V.G. PRETORIUS, ZS2AG.

1931 Listing	Operator	Present Call	Frequencies	
ZS2C	T.C. Lambson	(ZS2C)	7156 KC	Inactive
ZS2F	N. Jervis	(ZS1FH)	7038 KC	Active
ZS2L	R.F. Perkin	(ZS2L)		Active
ZS2Y	S.A. Bucholz	(ZS2CC)		Active
ZS2Z	Ben O'Brien	(ZS1ZZ)	7172 KC	Active
ZT2B	R.A. Dersley	(ZS2BJ)		Active
ZT2C	C.S. Rees	(ZS2CD)		Active
ZT2H	P.G. Pretorius	(ZS2AG)	7110 KC	Active

The Editor,
Radio ZS.

Sir,

The letter from Frank Johnstone, ZS2KS, in your May issue has stirred up a subject which has been causing serious concern among thinking amateurs in this country. The question is, is the South African Radio League guarding and fostering the interests of radio amateurs as it should – or is it simply ignoring the unpleasant things in life in the hope that they will go away?

ZS2KS suggests – and I agree – that a public relations campaign should be instituted by the League to improve our public image. I think it is at least as important, if we are to ensure our future, that we also do something about our image (or lack of one) among the country's legislators. Amateur organisations in other countries are acutely aware of the importance of this and they indulge extensively in lobbying when necessary.

In South Africa, government as well as opposition members of parliament are probably totally unaware of the existence of the League, and it is likely that they know as little about the radio amateur and his value to the country. Can one blame parliament if in its ignorance it decides one day to pass legislation which may be – to put it gently –"harmful" to amateur radio?

We have many strong arguments which, if brought to the attention of the government and parliamentarians in general, could bring security, status and the promise of a reasonably safe future for amateur radio in South Africa. Here is just one example: Electronics, the fastest-growing industry in the world today, is suffering from an ever-growing shortage of technicians and engineers. The League should have used this situation to our advantage years ago, by never letting the government and the public forget what a godsend amateur radio is for developing interest in electronics; by pointing out how this interest has led many amateurs into careers in electronics, by stressing that amateur radio is therefore of national importance, and so on. In other words, we must get it across that amateur radio is playing an indispensable rôle.

Instead of doing this sort of thing, however, our League appears to be down on its knees most of the time, apologising to officialdom for the fact that it exists. One wonders whether this is the result of fear of that cleverly-concealed old threat to the effect that we must regard amateur radio as "a privilege and not a right". Privilege my foot! South Africa is privileged to have such an active and keen amateur population at a time like this. All we need now is a League without an inferiority complex, willing to fight for our cause.

Ben van Tonder, ZS6BGL.

Gough Eiland,
29 April 1970.

Waarde Heer,

Ons tyd om na die Republiek terug te keer het aangebreek.

Hiermee wil ek u ten eerste hartlik bedank vir die Qsl kaarte van amateurs in Suid-Afrika en ook van ander lande, wat u so getrou na my bestuurder aangestuur het.

Ten tweede wil ek my hartlike dank uitspreek teenoor al my amateurs vriende in Suid-Afrika wat gesorg het vir baie aangename ure voor die mikrofoon. U het baie daartoe bygedra om die tyd nuttig te verkort en baie aangenaam te maak.

Met u hulp was ek instaat, om in die afgelope nege maande waarin ons enkel syband gebruik het, meer as

QSY Bladsy 28

Hamads

P.O. BOX 137, CAPE TOWN — RATES: R0.50 for 20 words, 2 cents per word thereafter for members. Non-members and commercial smalls: R1.00 for 20 words, 4 cents per word thereafter. PLEASE SEND THE CORRECT AMOUNT WITH EVERY HAMAD OR SMALL.

FOR SALE: "Two 20W Pye "Mercury" H.F. radio telephones. Completely transistorized receivers tunable from 535 Kc/s to 10 Mc/s. Transmitters 10 preset crystals can be easily adapted for V.F.O. operation. Robust construction suitable for vehicle mounting. These are now redundant A.M. radio telephones in perfect working condition and can be viewed at the offices of Messrs. Taylor and Mitchell Timber Supply Company (Pty) Limited, Dienst Street, Alrode Extension 2, Alberton, Transvaal. Photo copies of manufacturer's leaflet can be obtained from Taylor and Mitchell Timber Supply Company (Pty) Limited, P.O. Box 3731, Alrode, Transvaal. Price:- Highest offer ex our premises Alberton."

FOR SALE :

AR88D, Reconditioned, reliqued, R50.00.
PHILIPS GM 2883 signal generator, R25.00.
JOYSTICK AERIAL, R5.00.
Purser, 20 Whitehall Court, Killarney, Johannesburg.

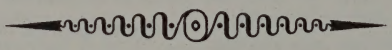
WANTED: Motor Cycle not later than 1969 Model — Please state Model - Make etc. ZS6AE, Box 61587, Marshalltown, Transvaal.

FOR SALE :
SSB/AM/CW Transmitter FL 100 B and Receiver FR 100 B - R250.00
Phillips Four Track Tape Recorder Type EL35 14V — R25.00. All with manuals. Please contact H. van Dijk, ZS6AUD, Eventide, P.O. Box 887, Vereeniging, Tvl.

FOR SALE :

Two Storno VHF 56 Mhz mobile Radio telephones, complete with control box and leads. 12 Volt operation. In as is condition. Offers in writing to DOWSON & DOBSON LTD., P.O. Box 26, Maitland, C.P.

FOR SALE: Apache TX1 complete with Dowkey antenna change-over relay and JT30 microphone, also NC300 receiver, both units in good condition and working order. Any reasonable offer for either unit or together for consideration. Contact W. G. MORTIMER, P.O. Box 132, UMKOMAAS, or phone UMKOMAAS 112, after 5.00 p.m.
Purchaser to arrange to collect.



3,000 kontakte in meer as 130 lande te maak.

Ek wil dit ook bekend maak dat ZD9BO *met* ZS2RM *as Qsl bestuurder binnekort sal voortgaan. Ek wil hulle alle sukses en geluk toe wens en hoop dat dit net soveel afleiding sal bied as in die verlede.*

Groete,
73's,
DE ZD9BN — Paul

ZD9BO QSLs :

OM Buckley, ZS2RM, has asked us to publish the following letter in regard to obtaining QSL cards from ZD9BO. "All stations wishing to receive a QSL for contacts with OM Sandy operating as ZD9BO from Gough Island are requested to please include a self addressed stamped envelope. The QSL manager is :

P. B. Buckley, ZS2RM,
P.O. Box 5181,
Port Elizabeth.
Republic of South Africa.

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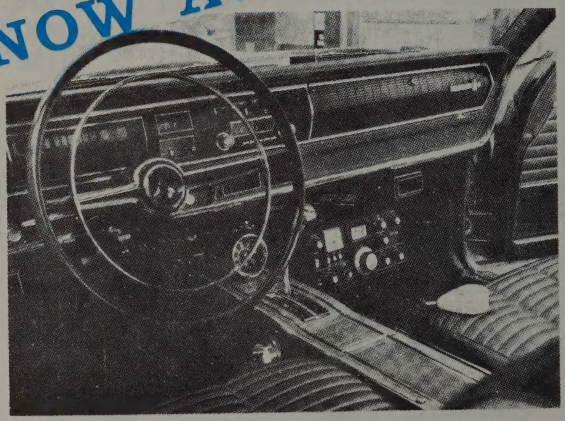

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PUBLISHED BY THE SOUTH AFRICAN RADIO LEAGUE, P. O. BOX 3911, CAPE TOWN
AND PRINTED BY TYPEX PRESS (PTY.) LTD., 201 BREE STREET, CAPE TOWN